



BUSINESS ANALYTICS SKILLS FOR THE FUTURE- PROOF SUPPLY CHAINS

BAS4SC PROJECT ABSTRACT



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Description

The BAS4SC – Business Analytics Skills for the Future-Proof Supply Chains project (number 2022-1-PL01-KA220-HED-000088856) is an international initiative implemented under the Erasmus+ KA220 program from 2022 to 2025. Its aim was to strengthen analytical competencies in the field of modern and resilient supply chains. The project addressed the growing demand in the labour market for specialists capable of using data to make informed decisions in logistics and supply chain management, particularly under conditions of uncertainty and rapid economic change.

The project was carried out by a consortium of universities from Poland (Poznan School of Logistics and Poznan University of Technology), Slovenia (University of Maribor), Croatia (J.J. Strossmayer University in Osijek, Faculty of Economics in Osijek), and Serbia (University of Novi Sad), with Poznan University of Technology serving as the project leader.

The main objective of BAS4SC was to develop and implement innovative educational programs in business analytics, designed to meet the needs of both higher education institutions and the logistics sector.



Outcomes

The outcomes of the BAS4SC project were comprehensive, encompassing both the development of educational content and the strengthening of collaboration between partner institutions.

As part of Work Package WP1, key activities were completed related to the preparation of project documentation and the effective management and monitoring of task quality. The BAS4SC project summary was developed (**WP1.1_BAS4SC Project Abstract**), providing a concise overview of the project's objectives, scope, and expected outcomes, which facilitated communication with both partners and external stakeholders.

The BAS4SC project developed a **WP1.2_Project Management Handbook – Quality & Evaluation Plan**. This comprehensive guide was designed to ensure the effective implementation, monitoring, and evaluation of all project activities. The document defines quality standards, outlines evaluation processes, and presents both qualitative and quantitative indicators for systematic progress tracking. It includes detailed information on the objectives of the Quality and Evaluation Plan, as well as guidelines for assessing project activities, management, partnerships, outcomes, transnational meetings, multiplier events, and training sessions. Additionally, the manual provides financial monitoring tools, such as sprint templates and quarterly financial reports, ensuring transparency and effective resource management. This handbook provided the BAS4SC project with a structured framework for quality control and evaluation, supporting the successful achievement of its strategic objectives.

Additionally, a project management manual was created, including a quality and evaluation plan and the implementation status of individual activities. This manual allowed for systematic progress monitoring, ensured adherence to the project schedule, and helped identify potential risks or areas requiring corrective action. It also serves as a guide for project partners, providing consistent instructions for management procedures, reporting, and quality assessment of results, thereby supporting the effective coordination of all project activities (**WP1.3_ project management handbook – quality & evaluation plan – statues of completion**). The preparation of this document was a key step in ensuring effective monitoring and quality control of all project activities. The process included analyzing project requirements and partner expectations, as well as defining criteria for assessing individual



activities and outcomes. The document was developed systematically and is organized into sections covering activity implementation, project management, partnership cooperation, project results, transnational meetings, dissemination events, and training.

WP2 – Competence needs analysis

Work Package WP2 focused on assessing the current state of education and identifying competency gaps in business analytics for future-proof supply chains. Activities included analysis of partner universities' curricula, surveys of academic staff and students, and research among logistics companies. These efforts revealed insufficient coverage of business analytics, business intelligence tools, and forecasting in supply chains, as well as discrepancies between graduate competencies and employer expectations. The results provided a direct basis for designing new teaching modules in subsequent project phases.

As part of WP2 activities, a series of reports was developed (Table 1). The WP2 activity report comprises a set of analytical studies aimed at identifying the extent to which logistics education programs are adapted to contemporary labour market requirements related to the use of Business Intelligence. Report A2.1 focuses on a review and comparative analysis of logistics education programs and course curricula at selected universities in Europe and the United States, with particular emphasis on content related to data analytics, BI, and tools supporting decision-making processes in logistics. Report A2.2 presents a summary of selected survey responses from academic staff, students, and graduates, revealing their perceptions of the adequacy of the study programs and their level of preparedness for work in a data-driven environment. Report A2.3 provides a synthetic overview of opinions from entrepreneurs, managers, and specialists in the logistics sector, highlighting practical market expectations regarding analytical competencies and skills related to the use of modern IT systems. The final WP2 output, Report A2.4, draws on the findings of all previous studies to define the competence gap in existing study programs, identifying key areas that require modification, updating, or strengthening in order to better respond to dynamic changes in logistics and supply chain management.



Table 1 WP2 activities and their reports on the analysis of training programs and competence needs in logistics

Activities	Report
A2.1: Checking a curriculums	A2.1_Checking a curriculums and study programs of logistics fields in high ranked world universities in terms of using BI in logistics
A2.2: Survey among academic teachers and students	A2.2_Summary of selected survey responses of teachers, students and graduates of the university
A2.3: Survey among logistic companies in partner country regarding needs of analytical competencies	A2.3_A summary of selected survey responses from entrepreneurs, managers and specialists
A2.4: Definition of competence gap in study programs according to results conducted research	A2.4_Competence gap in study programs according to results conducted research

WP3 – Courses programs & materials development

Work Package WP3 was dedicated to creating and implementing innovative teaching solutions in business analytics for future-proof supply chains. Study programs and course syllabi were developed, introducing new subjects into the curricula of partner universities. Textbooks in five languages were prepared for academic staff and students, covering both theoretical foundations and practical applications, including case studies and methodological guidelines.

In parallel, teaching materials were created to support instruction and self-learning, including multimedia presentations, practical exercises, tests, and independent work tasks, fostering active knowledge acquisition and analytical skill development in realistic business contexts. Additionally, a virtual environment was established to enable sharing and broad use of these educational resources. WP3 resulted in a modern set of teaching tools that equip



students with analytical competencies and practical preparation for work in modern, resilient supply chains.

A significant outcome of WP3 was also the development and implementation of an educational platform for sharing teaching materials (A3.5). This modern, integrated platform supports both teaching and self-learning processes by providing easy access to resources and a clear structure of content, thereby significantly enhancing the efficiency of course delivery and improving the learning and teaching experience for both students and lecturers.

Table 2 Summary of activities and reports implemented as part of Work Package WP2 – Development and evaluation of teaching programmes

Activities	Report
A3.1: Development of study programs and course cards	
A3.2: Introducing courses to existing study programs	A3.2_Introducing courses to existing study programs and intent letters
A3.3: Development of handbook	
A3.4: Development of teaching materials	
A3.5: Development of a virtual environment for placing materials	A3.5. Development of a virtual environment for placing materials
A3.6: Development of a AI presentations	
A3.7: Development of report on the evaluation of Course 1 - academic teachers	A3.7_Development of report on the evaluation of Course 1 – academic teachers
A3.8: Development of report on the evaluation of Course 2 - academic teachers	A3.8_Development of report on the evaluation of Course 2 – academic teachers



Activities	Report
A3.9: Development of report on the evaluation of Course 3 - academic teachers	A3.9_Development of report on the evaluation of Course 3 – academic teachers
A3.10: Development of report on the evaluation of Course 1 – students	A3.10_Development of report on the evaluation of Course 1 – students
A3.11: Development of report on the evaluation of Course 2 – students	A3.11_Development of report on the evaluation of Course 2 – students
A3.12: Development of report on the evaluation of Course 3 – students	A3.12_Development of report on the evaluation of Course 3 – students
A3.13: Development of innovative serious logistics game	

As part of the WP3 work package, a range of activities was carried out to develop, implement, and evaluate modern educational programs in the field of logistics and analytics. A key component of these activities was the evaluation of the three developed courses, which resulted in detailed assessment reports based on feedback from both academic staff and students (Table 2).

Activities A3.6–A3.13, although not initially included in the project application, significantly enhance the project's substantive value and innovative character. Their implementation demonstrates the consortium's proactive approach, which goes beyond the minimum planned activities and reflects a commitment to the continuous improvement of project quality and outcomes. The introduction of additional teaching materials (A3.6; A3.13), in-depth evaluation analyses, and innovative tools increases the project's usefulness for target groups and strengthens its sustainability and tangible impact on the teaching process. Collectively, these activities considerably raise the overall quality of the project, making it more comprehensive, innovative, and better aligned with the needs of both academic staff and students.

In total, six comprehensive evaluation reports were prepared for the three courses, providing a multidimensional assessment of the quality of the teaching process. Reports A3.7–



A3.9 reflect the academic staff perspective, including an analysis of the alignment of course content with the intended learning outcomes, the substantive quality of the materials, the adequacy of the applied teaching methods, and the level of preparedness of the courses for delivery in a digital environment. Reports A3.10–A3.12 present students’ assessments, focusing on the clarity of the content, the usefulness of the teaching materials, and the practical applicability of the acquired knowledge and skills.

The results from both respondent groups were consolidated and analysed to identify the strengths of the courses as well as areas requiring further improvement, enabling the refinement of content and teaching approaches.

WP4 – Piloting & testing

The pilot phase conducted under WP4 yielded tangible results through the practical testing of developed teaching content and curricula (Table 3). Workshops for lecturers improved competencies in using analytical tools in education, including business intelligence and data analysis, while fostering the exchange of experiences among academic staff from partner universities.

Pilot courses for students (C1–C3) enabled practical evaluation of the effectiveness of the teaching programs and materials. Students acquired both theoretical and practical knowledge through assignments, case studies, and exercises, allowing verification of the extent to which the content meets labour market needs and student expectations. Feedback from these pilots guided refinements to programs, materials, and teaching methods, addressing potential gaps and strengthening the practical component.

The two-stage C4 competition further increased student engagement, promoting a creative, team-based approach to solving logistics problems using analytical tools. The competition allowed participants to apply acquired knowledge in real-world-like scenarios, enhancing analytical skills, innovative thinking, and collaboration. Overall, the pilot phase provided essential feedback for refining materials in subsequent project activities.



Table 3 Summary of training activities and reports implemented as part of Work Package WP4

Activities	Report
A4.1: Teacher training activity (T)	Report A4.1_Teacher training activity (T)
A4.2: Student training activity (C1)	Report A4.2_Student training activity (C1)
A4.3: Student training activity (C2)	Report A4.3_Student training activity (C2)
A4.4: Student training activity (C3)	Report A4.4_Student training activity (C3)
A4.5: Student training activity (C4)	Report A4.5_Student training activity (C4)

The main outcome of WP3 was the development of three comprehensive courses worth a total of 12 ECTS credits. Initially, 10 ECTS credits were planned, but due to the broad scope of the topics covered and the extensive content, the consortium decided to increase the number to 12, awarding 4 ECTS to each course, thus emphasizing the equal importance of all thematic areas. This decision was approved by the project partners. The courses covered the following topics: advanced use of spreadsheets in logistics data analysis (C1), business intelligence (C2), and statistical methods in logistics data analysis (C3). Each course was equipped with extensive teaching materials, including textbooks that significantly exceeded the originally planned scope (80–120 pages): the C1 textbook was 259 pages long, the C2 textbook 160 pages, and the C3 textbook 180 pages. The textbooks developed as part of WP3 significantly exceeded the originally planned scope of 80–120 pages. This clearly demonstrates a significantly greater workload and expanded content compared to the original plan. Using the upper limit of the plan, 120 pages, as a reference point, the 259-page textbook for the C1 course represents a 115.8% increase in volume, more than doubling the planned maximum. The C2 course, with its 160-page textbook, saw a 33.3% increase, while the C3 course, with its 180-page textbook, saw a 50% increase. This significant exceedance of the original plan demonstrates that the project partners did not limit themselves to the minimum curriculum but opted for a deeper and more detailed content, resulting in higher-quality teaching materials and better support for the learning process. This is particularly evident in the C1 course, where the scale of the expansion suggests a very extensive discussion of issues related to the analysis



of logistics data in spreadsheets, further reinforcing the practical and expert nature of the entire educational package. All materials were developed in five languages.

Materials for 15 hours of lectures, pre- and post-test sets with a total of 50 questions, and materials for 30 hours of workshops were also prepared, including OER resources, case studies, videos, and presentations.

In addition, a single, consolidated case study was created, integrating content from all courses, allowing for a holistic approach to the topics covered. The project was enriched with materials that went beyond the original WP3 objectives, such as presentations on the role of artificial intelligence in business analytics and a logistics game concept combining tests, case studies, and two-stage debriefing exercises. Overall, this confirms the high level of content and innovative nature of the WP3 results and their significant contribution to the development of modern educational programs in data analysis and logistics.

WP5 – Dissemination of a project

Promotional and dissemination activities under WP5 were another key outcome. A communication strategy was developed, newsletters and scientific articles were produced, and conferences and regular dissemination events were organised. Notably, 19 multiplier events implemented by project partners significantly increased visibility and impact within the academic community and the logistics sector.

As part of Work Package WP5 (Table 4), a comprehensive set of activities was implemented to disseminate the project results and ensure effective communication with stakeholders at the local, national, and international levels. A key element was the development of the final dissemination strategy, which encompassed the project's digital presence, including the website and social media accounts (A5.1). This was documented in a report summarizing the adopted assumptions, tools, and communication channels. In parallel, newsletters (A5.2) were prepared and distributed, detailing the content scope, publication frequency, and target audiences. Another significant outcome was the publication of scientific articles (A5.3), contributing to knowledge advancement and promoting the project's results within the academic community. A major event was the organization of an international conference on the application of Business Analytics in logistics (A5.4), with a report documenting the event, presentation topics, and participation by experts and practitioners.



Additionally, regular communication activities were carried out according to the dissemination strategy (A5.5), including systematic reporting on project progress and results. Of particular importance was the organization of nineteen multiplier events (A5.6–A5.24), nine of which were implemented as additional WP5 activities, further strengthening the visibility and impact of the BAS4SC project.

Table 4 Summary of training activities and reports implemented as part of Work Package WP5

Activities	Report
A5.1: Develop the dissemination strategy the website and social media presence	A5.1_Disemination strategy final
A5.2: Develop newsletters	
A5.3: Develop two research articles	A5.3_Develop research articles
A5.4: Organizing an international conference on the use of business analytics in logistics	A5.4_Organizing an international conference
A5.5: Perform regular dissemination and communication of the project results as specified in the dissemination and communication strategy	A5.5_Perform regular dissemination
A5.6: Organise the 1 multiplier event	
A5.7: Organise the 2 multiplier event	
A5.8: Organise the 3 multiplier event	
A5.9: Organise the 4 multiplier event	
A5.10: Organise the 5 multiplier event	
A5.11: Organise the 6 multiplier event	
A5.12: Organise the 7 multiplier event	
A5.13: Organise the 8 multiplier event	
A5.14: Organise the 9 multiplier event	



Activities	Report
A5.15: Organise the 10 multiplier event	
A5.16: Organise the 11 multiplier event	
A5.17: Organise the 12 multiplier event	
A5.18: Organise the 13 multiplier event	
A5.19: Organise the 14 multiplier event	
A5.20: Organise the 15 multiplier event	
A5.21: Organise the 16 multiplier event	
A5.22: Organise the 17 multiplier event	
A5.23: Organise the 18 multiplier event	
A5.24: Organise the 19 multiplier event	
A5.25: Report Multiplier Events	A5.25_Report_Multiplier Events
A5.26: Report of newsletters	A5.26_Report of newsletters

As a result, BAS4SC contributed to the sustainable modernization of curricula, enhanced analytical skills of participants, and raised awareness of the role of data in building resilient, future-proof supply chains. The project strengthened international cooperation among universities and better prepared graduates for work in a dynamic, digital logistics environment.

The results and outcomes presented in the reports clearly demonstrate the very high effectiveness of the BAS4SC project, with many targets significantly exceeded. The dissemination strategy and the launch of the project website were completed 100% according to plan. The number of social media profiles reached five out of the planned four, representing 125% completion and reflecting an expanded scope of promotional activities.

Dissemination events were particularly successful: 19 multiplier events were organized out of the planned 10 (190% achievement), attracting 485 participants compared to the planned 200 (242.5% achievement). The conference also exceeded expectations, with 171 participants out of the planned 50 (342%) and 14 business representatives attending, representing 140% of the target. Regarding scientific publications, two articles were published



as planned, with two additional articles currently under review, further strengthening the project's scientific impact. Seven newsletters were sent compared to the planned six (116.7% achievement).

Educational and research activities achieved exceptional results. A total of 1,507 students participated in classes using the developed materials, compared to the planned 150 (1,004.7% achievement), while 572 teaching materials were downloaded, exceeding the planned 300 (190.7%). Participation in competency surveys also significantly surpassed targets: 464 student responses (265.1% of the target), 108 academic teachers (216%), and 127 logistics company representatives (141.1%). Participation in pilot educational activities exceeded targets as well, reaching 163.3% for students and 133.3% for academic staff. Student participation in international competitions reached 33, compared to the planned 25 (132%).

These results confirm not only the excellent achievement of quantitative indicators but also the high quality of the activities, as reflected in qualitative feedback from participants, the assessment of the innovativeness of project results, and the analysis of newsletters. Overall, the project not only met its objectives but significantly exceeded them in many areas, demonstrating strong interest from both the academic and business communities and the high practical value of the developed tools and materials.



Networking

As a result of the BAS4SC project, the partners initiated the creation of a sustainable educational and research network under the working title “***Business Analytics and Future Supply Chain Competences Network***” (alternatively: “*Network for Business Analytics and Supply Chain Competences*”). The initiative aims to continue and expand collaboration between universities, research institutions, and businesses in the areas of education and research on business analytics and supply chain transformation. The network is intended to facilitate the exchange of teaching experiences, scientific publications, and the implementation of research and applied projects focusing on data and digital technologies in logistics and supply chain management. This initiative naturally extends the BAS4SC project results, which brought together the academic community around the development of future competencies in supply chains.

Networking within this initiative goes beyond a formal exchange of contacts. It aims to create a dynamic knowledge ecosystem where researchers’ expertise, business practices, and innovative technological approaches converge. Through regular collaboration, joint projects, and open communication, the network will foster mutual learning, idea generation, and the building of lasting relationships based on trust and complementary competencies. The network is expected to become a platform where knowledge circulates dynamically, inspires action, and contributes to the development of modern, resilient, and intelligent supply chains.

The first network meeting will take place on **April 20, 2026**, serving as the inaugural event. During this meeting, participants will begin defining the initiative’s objectives and identity. The primary goal is to strengthen collaboration between universities, research institutions, and business partners in developing competencies in business analytics, artificial intelligence, and digital tools for supply chain management. Participants will formulate a strategic concept outlining the network’s main objectives, key thematic areas, and target groups, as well as potential outcomes of its activities. Work will also begin on developing a formal name and visual identity, including a logo, acronym, and slogan, to support communication and establish a recognizable brand.

Another key element of the kick-off meeting will be establishing the network’s core partnership. Participants will identify three to five entities to form the network’s core and



actively support its development. The agenda will also address future working meetings, focusing on: (1) developing a shared vision, (2) defining partners' expectations, and (3) identifying potential areas for cooperation. This stage will culminate in preparations for signing letters of intent or cooperation agreements, formally confirming partners' commitment to the network.

During the meeting, work on the network's organisational structure and governance model will also begin. Roles and responsibilities will be defined, including the appointment of a coordinator, program council, and working groups. A preliminary action plan for the network's first year will be developed. The inaugural meeting will thus not only mark the formal launch of the initiative but also define its long-term direction and operational framework.



Conclusions

The BAS4SC project (2022–2025), implemented under the Erasmus+ KA220 program, is an international initiative that has strengthened analytical competencies in modern and resilient supply chains. Through the development of innovative curricula, textbooks, and teaching materials in five languages, as well as the use of a virtual learning environment, students and academic staff were able to acquire knowledge in a practical and interactive manner.

All planned project activities were completed on schedule, demonstrating high efficiency in project management and strong commitment from the partners. Moreover, beyond the activities defined in the original project application, additional initiatives were implemented that exceeded the initial objectives. These actions contributed to a broader project impact, increased its substantive value, and ensured better alignment of outcomes with the dynamically changing needs of both the labour market and academia.

Pilot courses, workshops for academic staff, and team competitions enabled participants to test new content, enhance their analytical skills, and adapt teaching approaches to real labour market requirements. The project resulted in the modernisation of study programmes and the creation of a new field of study at Poznan University of Technology. It also strengthened international cooperation and initiated the establishment of a network under the working title "*Business Analytics and Future Supply Chain Competences Network*". This initiative will further support the development of education and research in the field of business analytics and intelligent supply chains.